

The Relationship between ABO Blood Group and Glioblastoma Multiforme

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Abstract

Glioblastoma Multiforme (GBM) is the most common type of primary brain tumor and its prognosis is poor. Some studies have investigated the relationship between ABO Blood Groups and cancer risk. In this study we evaluated the patients with GBM and control group regarding ABO Blood Groups. Secondly we compared the progression free survival (PFS) and overall survival (OS) regarding ABO Blood Group in patients with GBM. A total of 72 patients with GBM were enrolled from Mersin Government Hospital, Acıbadem Kayseri Hospital and Kayseri Training and Research Hospital between 2006-2012. Healthy donors that were admitted to the Turkish Red Crescent Blood Service in our city in year 2012 were selected as control group. Both of groups were compared regarding ABO Blood Groups. The PFS and OS were evaluated according to ABO Blood Groups in patients with GBM. We did not find any significant difference regarding the ratio of ABO Blood Groups between patients with GBM and control group. And there were no significant difference for PFS and OS among O, A, B, AB groups in patients with GBM. According to our results, comparison of control group with healthy donors and GBM patients, the ratio of blood groups was similar in both. And ABO Blood Groups have no effect on PFS and OS in patients with GBM. Also further studies are needed to explain whether there is any relationship between ABO Blood Group and Glioblastoma Multiforme.

Key words: Glioblastoma, blood groups, survival, brain tumors

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Introduction

Cancer is one of the most important health problems. Many factors have been evaluated in etiopathogenesis of cancer. One of them is ABO Blood Groups. Previously, some studies have investigated the relationship between ABO Blood Groups and cancer risk [1-4]. In some of the studies regarding the relationship between ABO Blood Groups and cancer, significant results were reported. In a study, it was reported that the risk of gastric cancer in blood group A was significantly higher than that in non-A groups (O, B and AB) [5]. In similarly, in other study it was found that the A blood group was associated with a modestly increased ovarian cancer risk compared to blood group O [6]. Also it was found that there were statistically significant difference between patients and controls with respect to O vs. non O blood group [7]. Glioblastoma (GBM) is the most common type of primary brain tumor. The prognosis of GBM is poor and its survival is commonly less than two years. Radiation, head trauma, exposure of N-nitroso compounds, tobacco, alcohol were reported as risk factors [8-10]. Nevertheless an inverse relationship was reported between history of allergies, fruit and/or vegetables intake and brain tumors [11,12]. Additionally, some studies reported that there was an increased incidence of brain cancer among white collar professionals, electrical, oil refinery and agriculture workers [13-15].

In present study, firstly we aimed to compare the patients with GBM with control groups regarding ABO Blood Groups. Secondly we evaluated the progression free survival (PFS) and overall survival (OS) regarding blood groups in patients with GBM.

Material and Method

A total of 72 patients with GBM were enrolled from Mersin Government Hospital, Acibadem Kayseri Hospital and Kayseri Training and Research Hospital between 2006-2012. All patients had grade IV GBM and ABO Blood Group was identified using hospital records. Age, sex, smoking, comorbidity, surgery types, adjuvant chemoradiotherapy, the date of diagnosis, time of progression, date of death and ABO Blood Groups of patients with GBM were recorded to Statistical Package for the Social Sciences 16.0 (SPSS 16.0, SPSS Inc., Chicago, IL, USA) statistical programme. The distributions of blood groups of the patients with GBM were compared with the distribution of blood groups of healthy donors that admitted to the Turkish Red Crescent Blood Service in our city in year 2012.

Statistical analysis were performed using the SPSS software version 16.0. Qualitative variables are given as percent and for the correlation of the patients with GBM and control group from the point of ABO Blood Group, chi-square test was used. To determine properties of patients with GBM, mean, frequencies analysis, one-way ANOVA and chi-square tests were performed. The effect of ABO Blood Groups on survival of patients with GBM was investigated using log-rank test. The Kaplan-Meier survival estimates were calculated. P value <0.05 was considered significant.

Results

Comparing the patients with GBM and control group as ABO blood groups, there was no significant difference ($p=0.097$). The ratios of O, A, B and AB groups were 32%, 46%, 12% and 10% in patients with GBM, respectively. In both of patients with GBM and control group, while the ratio of A group was higher than others, the ratio of AB group was lower (Table 1).

Table 1. Comparison of blood groups between patients with glioblastoma (GBM) and control groups

Groups	Patients with GBM	Control Group	P value
O Group	23 (32%)	5423 (31%)	0.797
A Group	33 (46%)	7756 (45%)	
B Group	9 (12%)	2819 (16%)	
AB Group	7 (10%)	1316 (8%)	
Total	72 (100%)	17314 (100%)	

The mean age of all patients with GBM was $56,8 \pm 0,29$ years. There was no significant difference regarding age, sex, smoking, comorbidity, surgery types and adjuvant chemoradiotherapy among O, A, B and AB groups ($p=0.921$, $p=0.113$, $p=0.502$, $p=0.391$, $p=0.218$, $p=0.558$, respectively) were encountered. These results were depicted in Table 2.

When evaluating progression free survival according to ABO Blood Groups in patients with GBM, we found no significant difference among blood groups. While the longest PFS was 9,59 months in GBM patients with group AB, the patients with group O had the lowest PFS as 4,56 months but there was no significant difference ($p=0.908$). Also there was no

significant difference regarding overall survival among blood groups ($p=0.507$). The longer OS was 11,72 months in GBM patients with group AB. PFS and OS values were depicted in Table 3. PFS and OS curves among blood groups were shown in Figure 1 and 2.

Table 2. Properties of patients according to blood groups in patients with GBM

Parameters	0 Group (n:23)	A Group (n:33)	B Group (n:9)	AB Group (n:7)	P value
Age (mean)	56,1±14,8	57,2±11,5	59,1±12,9	55,1±18,2	0.921
Sex					0.113
Male	16(69%)	28(85%)	6(67%)	3(43%)	
Female	7(31%)	5(15%)	3(33%)	4(57%)	
Smoking					0.502
Yes	6(26%)	12(36%)	1(11%)	2(28%)	
No	17(74%)	21(64%)	8(89%)	5(72%)	
Comorbidity					0.391
Yes	8(35%)	5(15%)	2(22%)	2(28%)	
No	15(65%)	28(85%)	7(78%)	5(72%)	
Surgery					0.218
Total	5(22%)	7(21%)	1(11%)	1(14%)	
Subtotal	5(22%)	17(52%)	5(56%)	3(43%)	
Biopsy	13(66%)	9(27%)	3(33%)	3(43%)	0.558
Adjuvant Therapy					
Yes	21(91%)	29(88%)	8(89%)	7(100%)	
No	2(9%)	4(12%)	1(11%)	0(9%)	

Table 3. Progression free survival (PFS) and overall survival (OS) values according to blood groups

Blood Groups	PFS (median months- 95% CI) (p=0,908)	OS (median months- 95%CI) (p=0,507)
0 Group	4,56 [0,50-8,62]	10,90 [3,54-18,26]
A Group	6,86 [5,35-8,37]	10,34 [8,60-12,09]
B Group	5,15 [0,85-9,45]	9,75 [2,20-17,31]
AB Group	9,59 [0,01-19,54]	11,72 [10,29-13,16]

Figure 1. Progression free survival curves according to Blood Groups

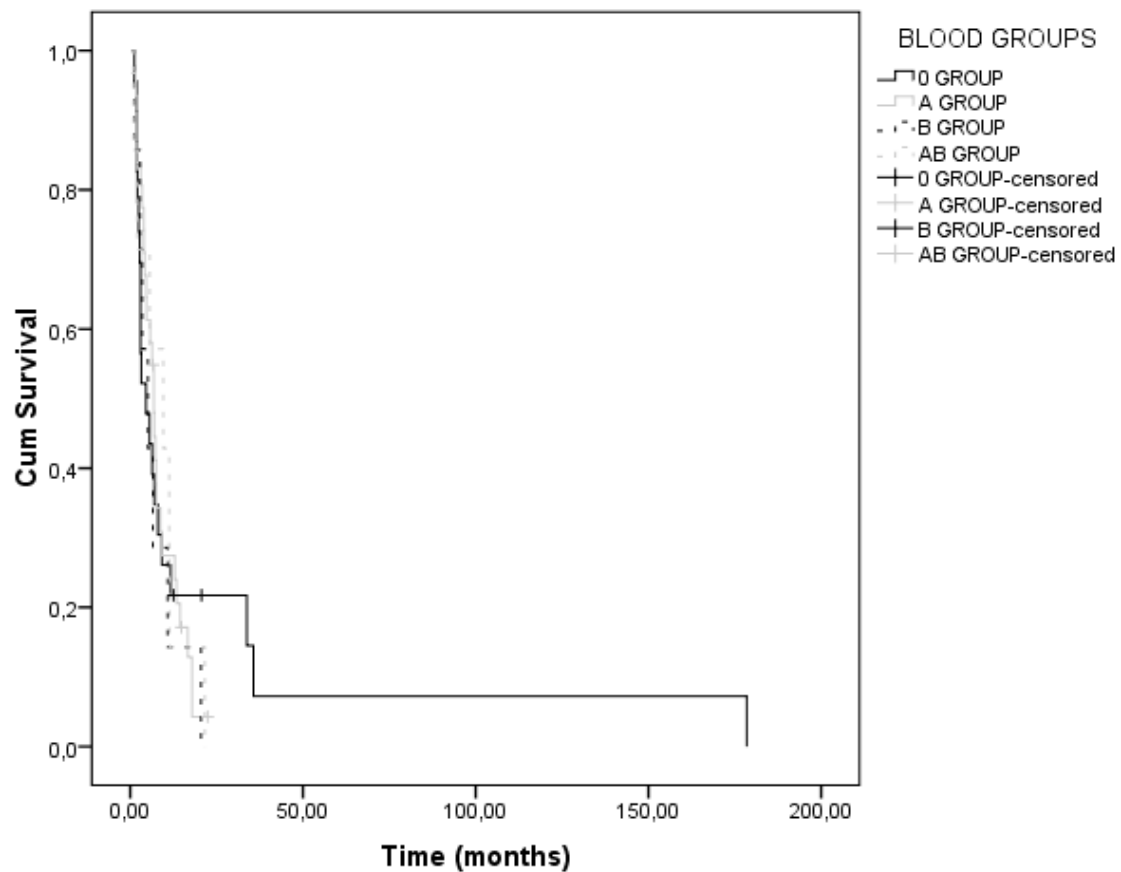
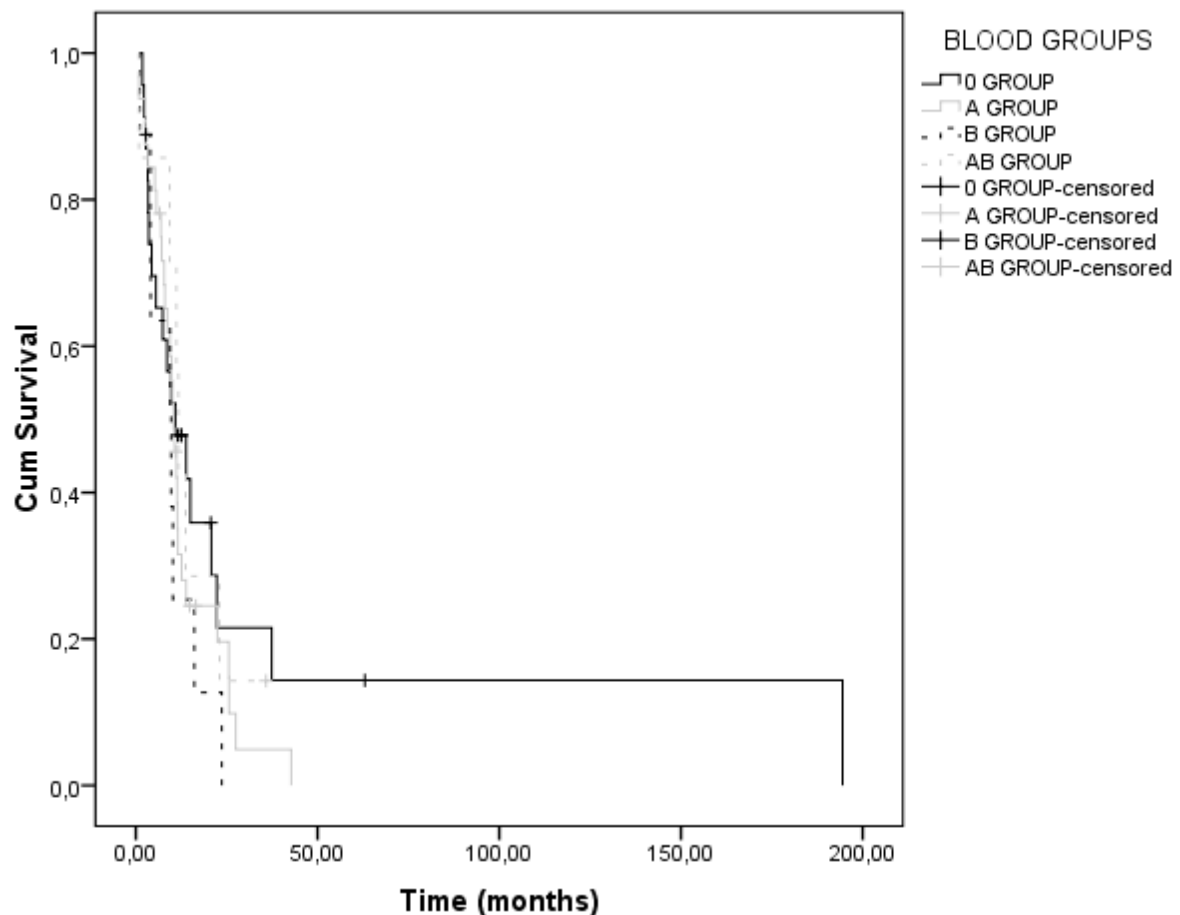


Figure 2. Overall Survival curves according to Blood Groups.



Discussion

In our study, we found that the distribution of blood groups of patients with GBM did not differ significantly than the general population. In previous studies, the different results were reported about the ratios of blood groups in patients with GBM. In a study, it was found that there was no significant difference regarding ABO blood groups between patients with GBM and general population [16]. In same study, it was found that the ratio of O, A, B, AB groups of patients with GBM were 38,1%, 30,4%, 22,7% and 8,7%, respectively. But in our study,

the most common blood group was group A. These results may be related to the distribution of blood groups in general population because the most common type of blood group is group A in Turkish general population. Another study, it has been reported that the most prevalent blood group was group A in patients with GBM [17].

In presented study, we evaluated secondly whether ABO blood groups have a role on survival of patients with GBM. We observed blood groups had no effect on survival of patients with GBM. In previously, many different results have been reported in other cancer types. No significant association was noted between blood type and overall or breast cancer-specific mortality [18]. Also it was reported there was no significant difference between ABO blood groups and survival of the patients with gastric cancer [19]. In contrast, another study reported that pancreas cancer patients with blood group A have significantly worse overall survival than other blood groups [20]. In another one it was found that blood group O had a significantly longer survival compared to non-O [1]. It has been shown that non-O blood type was significantly associated with decreased OS in patients with renal cell cancer [21].

In this study we aimed to investigate the effect of ABO blood group on patients with GBM. We observed no effect of ABO Blood Group on patients with GBM. Especially the literature informations about the effect of ABO Blood Group on incidence and survival of the patients with GBM are very limited. The relationship between blood groups and incidence or prognosis of cancer has been shown in many cancer types but the informations about this area are still not uniform. Due to difference of ABO genes among socioeconomic groups and geographic areas, the blood types may have a role on incidence and prognosis of cancer like the environmental factors. The relationship between blood types and cancer should be warranted by further studies.

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